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ABSTRACT

In this volume is reported the review of related literature that was conducted during the design phase of the study (July 1973 through January 1974). Its purpose was to provide input for the study design. Chapter 1 is a summary of the findings judged most relevant to three basic questions: (1) Who are the disadvantaged, how are they defined, and what are the personal characteristics and situational variables that may affect their educational progress? (2) What is the nature of college experience for disadvantaged young people, and what this experience prescribes as useful support programs? (3) What is the impact of Upward Bound (UB), Educational Talent Search (ETS), and other similar programs? Chapter 2 presents a definition and general description of the disadvantaged population. Chapter 3 presents a review of the literature related to the nature of the college experience of the disadvantaged student. Chapter 4 presents a review of the literature related to the impact of ETS, UB, and other similar programs. Chapter 5 presents a review of existing literature related to cost benefit analyses of education and training. (Author/AM)

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FINAL REPORT

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A STUDY OF THE NATIONAL UPWARD BOUND AND TALENT SEARCH PROGRAMS

VOLUME I

REVIEW OF THE LITERATURE RELEVANT TO THE UPWARD BOUND AND TALENT SEARCH PROGRAMS

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PREFACE AND ACKNOWLEDGEMENTS

A Study of the National Upward Bound and Talent Search Programs, the final report of the research conducted by the Research Triangle Institute under USOE contract Number OEC-0-73-7052, is presented in four volumes:

Volume I, Review of the Literature Relevant to the Upward Bound and Talent Search Programs.

Volume II, Estimates of the Target Population for the Upward Bound and Talent Search Programs.

Volume III, Descriptive Study of the Talent Search Program.

Volume IV, Evaluation Study of the Upward Bound Program.

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Chapter 1

Introduction

The Research Triangle Institute (RTI), under contract to the U.S. Office of Education (contract number OEC-0-73-7052), conducted a national study of the Upward Bound (UB) and Educational Talent Search (ETS) programs.[1/] The results of this RTI study are presented in a four-volume report entitled, A Study of the National Upward Bound and Talent Search Programs.[2/] This volume, Volume I of the four-volume RTI report, reports the review of related literature that was conducted during the design phase of the study (July 1973 to January 1974). Its purpose was to provide input for the study design. The review reported herein, though it was published in April 1976, was completed in January 1974 and was not updated to include the literature published or otherwise available since that time.

The titles of the other three volumes are: Volume II, Estimates of the Target Population for the Upward Bound and Talent Search Programs; Volume III, Descriptive Study of the Talent Search Program; and Volume IV, Evaluation Study of the Upward Bound Program.

The last 8 or 10 years have seen a burgeoning of special support programs, at the high school or college level, designed to help students who are at an educational disadvantage to raise their levels of interest in and capability for pursuing higher education. This has been largely a response to federal and foundation support made available for the purpose of equalizing access for prospective students who, by reason of poor response to traditional learning situations or discrimination rising from their poverty origin or

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1/ The terms "Talent Search" and "Educational Talent Search" are used synonymously in this report. The legislation, however, specifies that the program be known as "Talent Search."

2/ A Study of the National Upward Bound and Educational Talent Search Programs. Final Report 22U-889, Four Volumes. Research Triangle Park, N.C.: Research Triangle Institute, Center for Educational Research and Evaluation, April 1976.

minority group membership, have not appeared frequently in the main stream of American higher education. Such foundation sponsored activities as Project Opportunity, or the federally supported Educational Talent Search (ETS) and Upward Bound (UB) programs are typical of these special efforts to increase motivation and capability for continuing in higher education.

Given almost a decade of experience with such efforts, it seems appropriate to ask at this point three questions. First: Who are the disadvantaged? How are they defined, and what are the personal characteristics and situational variables that may affect their educational progress through high school and beyond?

Second, what is the nature of the college experience for "disadvantaged" young people who appear in higher education institutions, and what does this experience prescribe as potentially useful support programs?

Third, what has been the impact of ETS, UB, and similar programs?

Toward answering these questions, the research and evaluation literature of the last 10 years was searched for relevant studies or opinion pieces. The search included the ERIC files, with particular attention to any reports therein concerning ETS or UB projects; the journals that might be expected to carry evaluational studies; and the special collection of papers assembled by Educational Testing Service for the yet unpublished review of the relevant literature on the disadvantaged in college, prepared as a part of the evaluation of the Special Services program. The report that follows is a summary of the findings judged most relevant to the three basic questions above.

The remainder of this report is organized as follows: Chapter 2 presents a definition and general description of the disadvantaged population; Chapter 3 presents a review of the literature related to the nature of the college experience of the disadvantaged student; Chapter 4 presents a review of the literature related to the impact of Upward Bound, Talent Search, and other similar programs on their target populations; and Chapter 5 presents a review of existing literature related to cost benefit analyses of education and training.

Chapter 2

Who Are The Disadvantaged?

I. GENERAL DEFINITIONS AND COMMENTS

The basic legislation and the program manual for ETS and UB defines their target populations as students within the National Poverty Criterion who have academic potential but whose poverty background has caused either academic, motivational, or informational deficiencies or gaps. While the label "disadvantaged" has proved controversial and is admittedly vague, and has at times been replaced by other terms, it appears to have remained the most commonly used term to group students whose educational achievement is far below national standards. A useful definition of the "disadvantaged" for purposes of this report describes these students as "... members of groups which have been historically underrepresented in higher education and which, as groups, are clearly below national averages on economic and educational indices" (Kendrick and Thomas, 1970). While this definition skirts the issue of why these groups are disadvantaged, it does provide a rather useful and practical concept of the disadvantaged simply as educational and economic "have-nots."

The task of pinpointing those groups which are on the lower end of economic and educational scale is relatively simple. Because educational attainment is highly related to occupational and economic attainment, a group registering low on one scale will generally be at the same end of the spectrum on the other. The most superficial search for disadvantaged groups in American society cannot fail to miss the aggregation of racial and ethnic minorities at the lower end of the economic and educational spectrum. While Havighurst has noted that "there is no single ethnic group of any size that can be said to be disadvantaged educationally and economically as a whole group," he does go on to estimate that the bottom 15 to 20 percent of the population in income and educational achievement includes about 20 million English-speaking Caucasians, 8 million Blacks, 2 million Spanish-Americans, 700,000 Puerto Ricans, and 500,000 American Indians.

Proportionally, this means 11 percent of the English-speaking Caucasians, 40 percent of the Blacks, 33 percent of the Mexican Americans, 50 percent of the Puerto Ricans, and 70 percent of the American Indians (Havighurst, 1970). Although the numerically largest portion of the economically and educationally impoverished are White, Census reports on median education and income figures of Whites vs. non-Whites reveals substantial advantages for Whites as a subgroup. Since substantial proportions of ethnic subgroups fall under the label disadvantaged, research on support programs designed specifically for individuals from minority and ethnic background are also of central import for this review.

II. PRE-COLLEGE CHARACTERISTICS OF THE DISADVANTAGED

Who are the disadvantaged, educationally speaking? The following section, divided into six major areas (not mutually exclusive), provides a more detailed look at the educationally related characteristics of the disadvantaged and the factors, as described in recent literature, that may interfere with their ultimate level of educational attainment. These six areas are as follows:

a) Ability levels.

b) Performance in secondary school.

c) Persistence in secondary school.

d) Aspiration for college.

e) College-going trends.

f) Barriers to higher education for the disadvantaged.

Each topic will be discussed below.

A. Ability Levels

Although the use of standardized test scores for measuring academic ability has been a controversial issue with respect to the poor and the ethnic minorities, scholastic aptitude and other standardized cognitive tests are positively related to scholastic success as measured by traditional grading systems, and appear, if biased when applied to Blacks, to be biased in favor of rather than against this minority group. Davis and Tempe (1971) found, for example, that for both Whites and Blacks in a number

of colleges, scores on the College Board Scholastic Aptitude Test were equally predictive of grades, yet White students of a given SAT score level appeared to outperform Blacks with similar scores. A more reasonable and logical explanation of the purported "test bias" argument is probably that conventional tests reflect the conventional curriculum and instructional strategies, which have evolved with concern for the majority and with no particular concern until recently with the minority. The system, rather than the test reflecting that system, is biased.

Charges of test bias per se probably emanate from the simple fact of the relatively poor performance of minority groups on conventional tests. On virtually every test that purports to measure educational achievement and aptitude, the mean test scores of minority groups are about one standard deviation below the mean scores for the rest of the population (Crossland, 1971). Christopher Jencks has noted that the average 18-year-old Black has mean standardized test scores comparable to those of 14- or 15-year-old Whites (on both IQ and standardized tests) (Jencks, 1972, p. 81). James Coleman, in Equality of Educational Opportunity, documents the relatively poor test scores of minority groups (Coleman, 1966). Table 1 presents the results for Puerto Rican, Native American, Mexican American, Oriental, Black, and White (majority) twelfth graders.

Table 1

NATIONWIDE MEDIAN TEST SCORES FOR TWELFTH GRADE PUPILS, FALL 1965

	Racial or Ethnic Group					
	Puerto Rican	Native American	Mexican American	Oriental	Black	Majority
Average of Five Tests	43.1	45.1	44.4	50.1	41.1	52.0

SOURCE: James S. Coleman, Equality of Educational Opportunity. Washington, D.C.: U.S. Department of Health, Education, and Welfare, 1966, p. 20.

With the exception of Oriental Americans, the table clearly demonstrates that the standardized test scores of minority groups are far lower, on the average, than those of the majority group. Data compiled on UB students by Applied Data Research, Inc., shows that although the PSAT scores of UB participants are not dramatically different from those of all persons taking the test, they are considerably lower than those of the college bound population (Applied Data Research, Inc., July 1970 and August 1970). Thus, UB students do represent academic "risks" in that their assessed ability level by traditional scholastic aptitude tests is low as compared with most college bound students.

B. Performance in Secondary School

Unfortunately, there exists no adequate census of high school grade point averages broken down by race and income. There are considerable problems that interfere with any attempt to obtain adequate nationwide data on student performance in high school. The most fundamental problem concerns variation in grading systems and how grades in two different systems can be equated. A recent study of grading practices in 1069 high schools across the nation provided a distribution of types of grading systems used among U.S. high schools. Of the schools surveyed, 68 percent used only letter grades, 16 percent used a 0-100 percent system, 4 percent used some other system such as pass-fail grading, and 3 percent provided the study incomplete information on their grading system (Pinchak and Breland, 1973). The variety of systems used provides an obstacle to compiling national averages.

A second and more important problem is created by the variation, across high schools, in the grading standards used. Even among schools using the same grading system, an A is not necessarily consistent in value. The disadvantaged, by virtue of the fact that income and area of residence are frequently related, may attend high schools with lower grading standards, thus confounding any comparison of their performance with that of other students from other schools. A related problem in compiling nationwide data on grades has been ability tracking in high schools which, in effect, may have frequently separated the disadvantaged from other students, again making less meaningful any comparison of grade point averages.

However, the information presented in the preceding section on ability levels makes possible some inferences as to the high school performance of this group. Given that scholastic aptitude and other standardized cognitive tests reflect the ability of an individual to perform within the existing educational system and predict the future performance of a student within that system, then one may infer that the disadvantaged are not performing in high school at the rate of other students. Nevertheless for purposes of this study the best available measure of high school performance of the disadvantaged is high school persistence rates. These will be discussed next.

C. Persistence in Secondary School

Although the high school graduation rates for minority group students have increased considerably in recent years, they still lag behind the graduation rate of Whites (Kendrick and Thomas, 1970). Between 1963 and 1968, the percentage of non-White 18-year-olds graduating from high school increased from 36 to 63 percent (CEEB, 1973). Thus, the graduation rate of non-Whites in the mid to late 1960's lagged behind that of Whites by 12 to 14 percent. Robert Berls estimates that one out of eight Blacks who reach the twelfth grade will not graduate, whereas this is true for only one in 16 Whites (Berls, undated).

Minority groups are still more likely than Whites to drop out of high school even when family income is controlled--that is, when Whites and non-White groups of similar income are compared. A study of students whose family income was less than $5,000 found that 51 percent of the White and 74 percent of the non-White students dropped out of high school (Cohen and Yonkers, 1960). A study by Carter of Mexican Americans in Texas provided data yielding estimates that 60 percent of Mexican Americans who enter first grade will not graduate from high school. The graduation rate for Mexican Americans in California was estimated at 40 percent (Carter, 1970). Clift has noted that the high school attrition rate for American Indians is twice the national average. He also estimated in 1969 that 2 percent of the Puerto Ricans then attending high school would eventually graduate (Clift, 1969). It is clear that high school graduation rates of the disadvantaged still lag behind those of minority students.

Relatively high attrition rates for the disadvantaged appear to be not only a function of academic ability but also of socioeconomic status. Table 2 presents some Project Talent data analyzed by Berls (Berls, undated). The numbers in the cells of Table 2 are the probabilities for dropping out by SES and ability, and the numbers outside the cells represent dropout probabilities for the total SES and ability groups. As indicated in the table, the high school attrition rate for high ability low-SES students is four times as high as the rate for high SES students of the same ability levels. Thus, students whose disadvantage is solely economic and not academic, persist in markedly lower rates than other students in the same ability levels who come from high SES families.

Table 2

PROBABILITY OF FAILURE TO COMPLETE HIGH SCHOOL BY SES AND ABILITY

		Ability			
		High		Low	
SES		(1)	(2)	(3)	(4)
High	(1)	1.4	2.0	6.5	13.5
	(2)	2.0	4.4	8.6	17.4
Low	(3)	3.2	5.7	11.9	21.6
	(4)	5.6	10.8	15.2	28.3

SOURCE: Berls, Robert H. "Higher Education Opportunity and Achievement in the U.S." In The economics and financing of higher education in the U.S.: A compendium of papers. Printed for the use of the Joint Economic Committee, 91st Congress of the U.S., undated.

D. Aspirations for College

Between 1939 and 1959, the educational aspirations of all income groups increased at a uniform rate, however, between 1960 and 1966 the aspirations of the poor began to accelerate more rapidly (Froomkin, 1970).

Table 3 illustrates the trend in aspirations for higher education. The numbers of students who aspire to enter college and who are in the lowest income quarter appear to have doubled during the period 1959 to 1966. The Equality of Educational Opportunity survey found that in the mid-1960's, Blacks showed higher apparent educational aspirations than Whites at comparable economic levels (Coleman, 1966). The same report also demonstrated that among students with very low ability scores, minority students were twice as likely as White students to state plans for attending college. Thus, two-thirds of the low ability minority and one-third of the low ability White students planned on college (Coleman, 1966). Jaffee and Adams, in an analysis of 1965-66 census data, also found that more Black high school seniors were planning on college than were Whites (Jaffe and Adams, 1970). Thus, minority students appear to aspire to college at the same or higher rate than White students.

Table 3

PROPORTION OF HIGH SCHOOL SENIORS IN INCOME QUARTILES WHO PLAN TO ATTEND COLLEGE: 1959 AND 1966

Year	Income Quartiles			
	Top	3	2	Lowest
1959	68	52	40	23
1966	74	65	52	46

SOURCE: Joseph Froomkin, Aspirations, Enrollments, and Resources. Washington, D.C.: U.S. Department of Health, Education, and Welfare, 1970.

E. Barriers to Higher Education for the Disadvantaged

If a substantial proportion of high school graduates of minority origin do not attend college, what prevents them from doing so? Empirical data on the barriers to higher education for minorities is more difficult to obtain than are rates of enrollment. Fred E. Crossland (1971) has

listed a number of major barriers to higher education for minorities (Crossland, 1971). Among these are: (1) test barrier, (2) poor preparation barrier, (3) money barrier, (4) distance barrier, and (5) race barrier. Each will be discussed below.

1. Test Barrier

In the discussion of ability levels of the disadvantaged, the lower performance of minority groups on standardized tests has been documented. The generally low scores of this group clearly show that if admission to college were based solely on test scores, minority groups would be underrepresented in higher education institutions (Crossland, 1971). Crossland reflects the related arguments of cultural bias, predictive value of tests, and the possibility that tests do not measure the appropriate abilities; but, the test as a barrier issue has most precisely to do with whether or not colleges are selecting non-Whites on the basis of test scores. There is no known current review of admissions practices in traditionally selective colleges across the country--where a test score is introjected into the admissions decision, the inevitable result would be to screenout more Blacks than Whites.

However, that the test barrier may be breaking down, to be replaced by another barrier is suggested by a study by Davis and Kerner (Davis and Kerner, 1971). In reviewing data from a number of public universities in a southern state, Davis and Kerner found a wide but significantly lowerrange of test scores for Blacks admitted to public universities than for admitted Whites, but a much higher range of high school GPA's. They found no evidence of a Black student refused admission solely on the basis of test score. Admissions officials evidently insisted on superior academic performance in high school, beyond that required for Whites, in order to compensate for poor test scores. This suggests that the concern of admissions officers with an oversupply of applicants is, first, to select those who can succeed in college. It is also evident that they are willing to trust past performance records and ignore test scores if the past performance level is sufficiently high. This practice, though, results inevitably in requiring a higher past

performance level for Blacks than for Whites. Thus, one barrier has only been replaced with another, probably because tests seem to be more vulnerable to attach as culturally biased than past performance records themselves.

2. Poor Preparation Barrier

A second barrier to higher education is poor preparation in secondary and elementary schools. Crossland summarizes the sources of poor preparation, which include the suppositions that minority students more frequently than Whites elect or are counseled into nonacademic programs; live in communities with poorer educational facilities, faculties, and resources; and usually attend schools where they are effectively segregated from majority students (Crossland, 1971). These factors not only potentially explain lower academic performance level, but also have implications for motivation to attend college and for acquiring credentials appropriate in kind as well as in quality.

3. Money Barrier

Insufficient family income is another obvious barrier to higher education for these groups. The median family income for Whites in 1970 was $10,236 against $6,279 for Blacks (Public Use Samples From the 1970 Census, 1972). In 1969, the average annual expense of one year at a private college was estimated as $5,000, while the public college expense was estimated at $2,000 (Crossland, 1971). The previous section on college enrollment documented the underenrollment of low income students. In a study of high school seniors in five major U.S. cities, more than half of the respondents who did not attend college said that the prime reason they did not attend was lack of money. These same respondents estimated that they needed $1,000 to $2,000 in order to attend (Knoell, 1970).

4. Distance Barrier

A fourth barrier to higher education for these groups has been distance or accessibility of higher educational institutions. The distance barrier would seem to be integrally related to the financial barrier, for attending a college within commuting distance would permit savings of real costs of housing and food. However, recent

studies by Trent and Medsker and by Willingham suggests that the burgeoning number of community colleges has played a crucial role in breaking down this particular barrier (Trent and Medsker, 1968; Willingham, 1970). Thus, distance may no longer constitute a significant barrier for disadvantaged students. Yet, the fact that the easing influence is but one narrow segment of the total range of higher education institutions, and that the goal and output of community colleges probably represents only a portion of high level manpower needs and access to later opportunity, the distance barrier can still be of significant import and concern.

5. Race Barrier

A final barrier for minority students emphasized by Crossland is racial discrimination. In a pure form, this would mean an institution is closed, by law or formal internal policy, to some racial groups; in a more subtle form, it would mean selection or exclusion of a member of an ethnic group because of a pervasive perception of the academic disabilities associated with that group. Crossland concludes that the real impact of discrimination cannot be addressed until the academic and economic disabilities of minority groups have been removed.

Perhaps of greater impact as a barrier in this regard is not over discrimination, but the subtle climatic forces that signal an institution as appropriate for "subgroup X" but not for "subgroup Y". That such convictions could be sufficiently pervasive in a society and both subgroups X and Y accept them and act accordingly is an argument presented by Davis and Borders-Patterson (1971).

The five barriers listed by Crossland are, of course, logically interrelated--for example, the distance barrier must be operative for the most part because of the cost barrier. A simple conceptual structure of barriers would be: (1) economic barriers, given less than free higher education at all levels (and equality of freedom to forego wage earning while in college); or, for that matter, cost differentials among institutions of various purpose and impact; (2) personal readiness barriers, given differences in ability to learn through instructional strategies employed, and in ability to perform well by the standards employed or an unwillingness to abandon those standards

or to develop alternate instructional strategies for their attainment; (3) social-psychological barriers, ranging from discrimination by the institution to pervasive perceptions in society, or among members of a subgroup in particular, that college or some institutions are appropriate only for members of other groups. These barriers may persist as long as there are situations where one recognizable subgroup on a particular campus will constitute a majority of students. Although these barriers are general, they apply to different institutions in different ways. It is too well known to require documentation that selectivity and prestige of an institution is positively related to cost, though availability of public universities makes this relationship much less than perfect; and, that there are ranges of institutions in lines of ability and preparation of students, and in terms of programs offered. Thus, the notion of barriers needs to be considered not only in terms of barriers to higher education opportunity in general, but also in terms of barriers to entry by some groups to some particular classes of institutions. The extent of the inequities in distribution of students of various income levels among colleges of different types is summarized by the College Entrance Examination Board's Panel on Financing Low-Income and Minority Students in Higher Education, using data from the 1969 normative studies of the American Council on Education as shown in Table 4 (CEEB, 1973).

F. Extent of Financial Need

In addressing the question of financial need of disadvantaged students there are several key areas which require attention. These are: cost of college, the family's ability to pay, amount of aid required, type of aid required, and extent of commitment of aid. Figures given in the section on financial barriers to higher education indicate that the average annual cost for study at public institutions represents almost one-third of the median annual income of Black's in 1970. Thus, without substantial and often full financial support these students cannot hope to fulfill their educational ambitions. In Knoell's sample those high school graduates who did not attend college estimated that they would need $1,000 to $2,000 in order to attend (Knoell, 1970). Saunders and James, in their study of the

Table 4

DISTRIBUTION OF FRESHMEN ENTERING COLLEGE IN 1969 AMONG TYPES OF COLLEGES, BY FAMILY-INCOME GROUP, AND IN PERCENT

Family Income	Two-Year Colleges		Four-Year Colleges		Universities	
	Public	Private	Public	Private	Public	Private
Less than $4,000	37%	9%	20%	17%	14%	4%
$4,000-5,999	34	11	20	15	16	3
$6,000-7,999	33	11	20	15	18	3
$8,000-9,999	30	10	21	16	21	4
$10,000-14,999	26	9	20	18	24	5
$15,000-19,999	20	8	18	19	27	7
$20,000-24,999	19	8	14	23	28	9
$25,000-29,999	13	9	12	27	28	12
More than $30,000	12	7	9	30	28	16

NOTE: Rows may not add to 100 percent because of rounding.

financial need of UB students, estimated that the average cost of nine-month attendance of a UB student in 1968 was $2,065 and the average contribution of UB parents was $102.00 (Saunders and James, 1968). Thus the average need of a UB student would be slightly less than $2,000 per year.

Aside from the amount of aid needed, type of aid and length of time for which aid is committed is also important. Saunders and James recommended that funding for UB students involve guaranteed long-term commitments to students, extending beyond the freshman year. The anxiety invoked by the uncertainty over which sufficient funds will be available for four years has a negative influence on a student's willingness to perform and persist in college. They hesitate to attempt to standardize the amount of financial support necessary to disadvantaged students. Instead they note that the

needs of disadvantaged students should be determined by taking into consideration: (1) the resource deficiency of the individual and (2) the institutional goals and resources available at a given institution (Saunders and James, 1968).

In addition, the form of financial aid and the composition of the aid package are important. Aid packages top-heavy with loans or work study may be unsuitable for disadvantaged students. Two studies suggest that the poor shy away from loans for fear of incurring huge debts which they will be unable to repay (Educational Associates, Inc., 1969; Council of Ontario Universities, 1971). Work study programs, as has been pointed out by several investigators, may detract from the study time of those students who need it most (Greenleigh, 1970; Levitan, 1969; Shea, 1968).

In the study of Special Services Programs, Davis, Burkheimer, and Borders-Patterson (Davis, et. al., 1975) found that 47 percent of students from families within the National Poverty Criterion (in a sample of institutions not nationally representative but heavy with institutions enrolling large numbers of disadvantaged) receive some sort of financial aid, but 42 percent of students from families above that criterion also reported financial aid. In addition, there were differences in kinds of aid reported: 40 percent of poverty, as compared to 22 percent of "modal" students, reported work-study program aid; academic scholarships were reported by 15 percent of the poverty students and 18 percent of the modals. Educational opportunity grants were reported by 45 percent of the poverty students, and 21 percent of the modals. With regard to loans, 35 percent of poverty level students and 25 percent of modals reported NDEA loans; other types of loans (federally insured, college, bank, etc.) were reported with about equal frequency. About one-fourth of the modals, and a little more than half of the poverty level students, reported no support from family, guardians, or other relatives.

Chapter 3

What is the Nature of the College Experience of the Disadvantaged?

I. COLLEGE ENTRANCE RATES OF THE DISADVANTAGED

The college enrollment rate of minority and poverty-level students indicates that the educational aspirations of these students (reported in a previous section) are not fulfilled. College enrollment numbers depend on high school graduation rates. Berls (unpublished) working principally from the Jaffe and Adams (1970) data, found that although the White/non-White differences (as proportions of the 18-year-old population) in high school completion rate gradually widened from 1950 to 1962, it began narrowing in 1963:

> ...while non-Whites were completing high school in 1963 at only slightly more than half the White rate, by 1968 the gap had narrowed sharply, so that slightly more than 6 of 10 non-Whites (as a percentage of 18-year-old non-Whites) were finishing high school compared to about 7.6 in 10 of Whites. Non-Whites were graduating from high school in 1968 at about the White rate for 1963.

He concludes that the gap is likely to continue to narrow. For comparable data on college entrance, Berls (unpublished) states:

> Non-Whites doubled in college entrance and somewhat more than doubled in high school graduation over the period 1935 to 1962.... For [the six years since 1962], 1963-68, Whites increased their high school completion and college entrance rates by 31 percent and 77 percent, respectively. Non-White rates grew much more rapidly: by 140 percent for high school graduation and by 191 percent for college entrance (almost triple the growth rate for Whites). Whereas it took from 1935 to 1962 for non-Whites to double their college rate, and somewhat more than double their high school completion rate, non-Whites more than doubled their high school completion and almost tripled their rate of entrance to college in only 6 rather than 27 years. The White rate of growth for these two thresholds is slowing down.

A report by Froomkin of patterns of aspirations and their fulfillment shows, however, that economic circumstances continue to exclude many low income students who would like to attend college (Froomkin, 1970). Table 5 summarizes his analyses of Jaffe and Adams' data in this regard. Students from families with incomes of $7,500 or more had more than twice the chance of realizing their hopes for college attendance as students from families with incomes of less than $3,000. In 1970, this discrepancy in attendance by income remained. The enrollment of 18 to 24 year olds in the bottom income quarter was 20 percent whereas the enrollment of the same age group in the top quarter was three times as great at 60 percent (CEEB, 1973).

Table 5

PATTERNS OF ASPIRATIONS FOR COLLEGE AND THEIR FULFILLMENT: 1966 HIGH SCHOOL GRADUATES, BY INCOME GROUP, AND IN PERCENT

Family Income	Percent Responding "Yes" for Planning College	Percent Having Attended College by February 1967	Percent of College Goals Achieved
Less than $3,000	46%	17%	37%
$3,000 - $4,999	47	32	67
$5,000 - $7,499	58	37	63
More than $7,500	71	57	80

SOURCE: Joseph Froomkin, Aspirations, Enrollments, and Resources. Washington, D.C.: U.S. Department of Health, Education, and Welfare, 1970, pp. 20-22.

With regard to the recent trends in numbers of students in college, changes over the six year period from 1963 to 1968 again show a much more rapid growth rate for non-Whites than for Whites. Berls (unpublished) reports:

> The total number of non-Whites in college (age 16-24) slightly less than doubled from 1963 to 1968 (93.6 percent), whereas the Whites increased at a substantially lower rate--52.5 percent--but from a much bigger base, of course. The women of both races increased in college at a faster rate than the men. Of perhaps the greatest importance, however, is that while non-Whites in college comprised only 11.6 percent of the 16- to 24-year-old cohort of high school graduates in 1963, non-Whites in college made up 28.4 percent of this same age cohort in 1969--more than doubling in the period 1963-68. The Whites grew from 22.4 percent of the age cohort in college to 35.5 percent. In 1963 the proportion of non-Whites in college was slightly more than half of the White proportion, but by 1968 the proportion of non-Whites in college had increased to 80 percent of the White proportion for the 16- to 24-year-old group of high school graduates.

In spite of gains in high school graduation and college entrance rates, underrepresentation of minorities and low SES students in college still holds for Blacks, Mexican Americans, Puerto Ricans, and American Indians when numbers in college as a proportion of numbers in the population are considered. Table 6 summarizes the status of each of these groups in 1970 as estimated by Crossland and clearly demonstrates the degree of underenrollment for each (Crossland, 1971). Comparing the ethnic groups from the most to the least underrepresented, the list is as follows: American Indians, Mexican Americans, Puerto Ricans, and Blacks. It is important to note that these may be conservative estimates since the median age of Whites is substantially higher than for non-Whites due to the reduced life span of minority groups, and thus there are larger proportions of eligible students; also, the estimates of numbers of some groups, particularly American Indians, may be substantially off.

In summary, while the representation of minorities and low SES students in college has significantly increased in the last decade, their attendance rates remain below that of Whites.

Distribution of enrollment at different types of colleges provides another perspective from which to assess the educational status of minority groups in higher education. (Some data on distribution of income have

Table 6

1970 ENROLLMENT IN HIGHER EDUCATION INSTITUTIONS—
THE STATUS OF ETHNIC GROUPS

Ethnic Group	Percent of Total Population 1970	Estimated Percent of Total Higher Education Enrollment	Percent of Total Ethnic Population Enrolled	Percent of Each Ethnic Group in 1970 Freshman Class (estimated)	Percent Increase Necessary to Reach Proportionate Enrollment
Black	11.5	5.8	2.0	6.6	116%
Mexican American	2.4	0.6	1.0	0.9	330%
Puerto Rican	0.7	0.3	1.3	0.4	225%
American Indian	0.4	0.1	0.6	0.1	650%
Subtotal	15.0	6.8	1.8	8.0	--
All Others	85.0	93.2	4.3	92.0	--
Total	100.0	100.0	3.9	100.0	--

SOURCE: Fred E. Crossland, Minority Access to College, New York: Schoken Books, 1971, 10, 15, 16, 19, and 13. Crossland synthesized data from three sources: Census, DHEW, and ACE reports.

already been presented in a previous section.) One relevant question is: What types of colleges are absorbing the upsurge of minority enrollments? An analysis by Crossland indicates that much of this increase has occurred in community and junior colleges (Crossland, 1971). In 1970, more than half of all Black freshmen enrolled in junior colleges. Similarly high community and junior college enrollments are found among other minority groups. A study of Mexican-American enrollment in five Southwestern states found that 90 percent of all Mexican-American students attending colleges in the Southwest enroll in public institutions, with more than twice as many attending community colleges as state colleges and universities

(Ferrin, et al., 1972). Likewise Native-American students in college are more likely to be in two-year colleges than are other students (CEEB, 1973). Even among students at top achievement levels, minority students are disproportionately enrolled in community colleges. An analysis by CEEB shows that Black male students at the top achievement level are nearly three times as likely to attend a two-year college as White male students (CEEB, 1973).

Another trend in distribution of college enrollment has been the decreasing popularity of traditionally Black colleges and universities among Black college students. Whereas in 1964, more than half of all Black college students attended traditionally Black institutions, in 1970 only one-third did so (Crossland, 1971). This may be explained by both the increasing enrollment in community colleges and the probable increased recruitment of Black students by White institutions, due to Civil Rights compliance pressures.

Another indicator of equality of enrollment is type of degree programs in which disadvantaged students enroll. An unpublished paper cited in the CEEB report gives evidence that Blacks and Chicanos in community colleges may be more likely than White students to be enrolled in no degree-credit programs or to be part-time students (CEEB, 1973).

In summary, five statements can be made about enrollment of the disadvantaged in college. These are:

a) The proportion of minority students attending college has increased substantially in the last decade. Among Blacks, enrollment has doubled.

b) However, since White enrollments have also increased, a gap between White and minority enrollments has remained.

c) A large proportion of the growth in enrollment of minority students has taken place at the community and junior college level.

d) Attendance of Blacks at traditionally Black institutions has declined in the last decade.

e) There is some evidence that minority students at community colleges are more likely to be part-time students or students enrolled in no-credit degree programs.

Thus, while important steps toward achieving equal access to college for disadvantaged have been taken, a goal of parity, by race or by income, has not been reached. In addition, as stated in the CEEB report, "access alone is not sufficient; equal opportunity also demands equalization in the distribution of minority and majority students among types of colleges and universities, and among types of programs." (CEEB, 1973).

II. ACADEMIC PERFORMANCE IN COLLEGE: PREDICTING GPA

Prediction of college performance has been the focus of a massive body of research. The validity of test scores and high school grade point average or rank-in-class for predicting the subsequent performance of disadvantaged and regular students has been studied extensively. The following statements summarize the general feelings of these types of studies:

a) High school grade point average or rank seems to be the best single predictor of college success for the general student population (Kendrick and Thomas, 1970; Astin, 1970).

b) The most efficient prediction is obtained through an optimal weighting of grade point average and a single aptitude or scholastic ability test consisting of one or two scores (Kendrick and Thomas, 1970).

c) Despite the recent controversy over the validity of test scores in predicting the performance of non-Whites, a review of relevant studies demonstrates that SAT's predict as well for non-Whites as they do for Whites. In fact, SAT's may be biased in the favor of non-Whites in that they often overpredict the grade point averages of non-Whites (Cleary, 1968; Kendrick and Thomas, 1970; Grant and Bray, 1970; Davis and Temp, 1971).

Comparing the disadvantaged in special collegiate programs with other minority students in college, Helen Astin found that Black disadvantaged college students had higher GPA's than did a random group of Black college students

(Astin, 1970). However, there are several issues which must be taken into consideration when evaluating such a finding. Two phenomena which may tend to favor special students are that: (a) special program students may carry reduced course loads, and (b) grades in remedial courses may be averaged in with those for regular courses. Unless these factors are accounted for, it is unfair to compare special program and regular student GPA's.

Melnick has reviewed a number of studies on college GPA of the disadvantaged and concluded that the disadvantaged appear to do C to C- work in college (Melnick, 1971). A more recent census by Davis, Burkheimer, and Borders-Patterson (1975) in some 120 institutions involved in their evaluation of Special Services programs found past performance and college performance records as shown in Tables 7 and 8.

These data suggest (a) that the difference in high school grades for poverty versus nonpoverty students laster attending college is not as great as later differences in college grades; (b) that there may be marked differences between poverty versus nonpoverty as a function of race; and (c) that of all poverty groups together, about half report overall grades higher than C+, a proportion, however, not markedly different from that for nonpoverty students.

III. PERSISTANCE IN COLLEGE

The literature on college attrition clearly suggests that family SES is inversely related to a student's chances of college graduation (Eckland, 1964; Panos and Astin, 1968; Sewell and Shah, 1967). Thus, once granted access to higher education the poor remain at a disadvantage relative to more affluent students. Sewell, in a study of 9,000 Wisconsin high school seniors found that a high SES student has a six to one advantage over a two SES student of attaining college graduation (Sewell, 1971). Even when ability is controlled, Sewell found that high SES students persist at a greater rate than low SES students. The corresponding ratios ranged from nine to one among the high ability students (Sewell, 1971). Despite the importance of SES in predicting attrition rates, a student's own ability is even more important than SES in determining whether he or she will persist (Sewell and Shah, 1967; Wegner and Sewell, 1970).

Table 7

PERCENTAGES OF RESPONDENTS REPORTING OVERALL HIGH SCHOOL GRADE AVERAGES HIGHER THAN C+

Ethnic Classification	"Disadvantagement" Classification	
	Poverty Level	Modal
Native American	56%	70%
Black	64	66
Mexican American	57	64
White	71	73
Oriental	60	84
Puerto Rican	57	63
Other	72	73
Total	65	70

NOTE: Percentages given are those reporting grades higher than C+ within respondents of the cross-classified group (i.e., 56 percent of Native American poverty level respondents).

Table 8

PERCENTAGES OF RESPONDENTS REPORTING OVERALL GRADES IN COLLEGE HIGHER THAN C+

Ethnic Classification	"Disadvantagement" Classification	
	Poverty Level	Modal
Native American	34%	47%
Black	41	43
Mexican American	39	52
White	63	64
Oriental	60	57
Puerto Rican	32	32
Other	68	56
Total	47	56

NOTE: Percentages given are of those reporting grades higher than C+ within respondents of the cross-classified group (i.e., 34 percent of Native American poverty-level respondents).

IV. SOCIAL ADJUSTMENT TO COLLEGE

The problems of disadvantaged students in college are not limited to the academic sphere. Most of these students are, by definition, culturally different from the majority of the college population. In addition, students in special collegiate programs, particularly in selective institutions, may be labeled by instructors and other students, by their participation in remedial work, as different and often inferior. Fuchs and Havighurst, in a book on Indian education in the United States, suggest that a conflict is faced by American Indian college students, between the demands of higher educational institutions and the obligations, values, and life styles of their home communities (Fuchs and Havighurst, 1972). The cultural background of these students may make it difficult for them to communicate effectively with either their fellow students or their professors. A study of Black students in both predominately Black and White colleges found that Blacks at Black colleges attribute their academic difficulties to poor study habits whereas Blacks at predominately White colleges emphasized inadequate social life and poor high school preparation (Jones, Harris, and Hauck, 1971). In a study of Black students in predominately White North Carolina colleges, Davis and Borders-Patterson reported that Blacks on White residential campuses were becoming increasingly polarized, aware of their identity, and were growing in hostility toward the "White establishment." The problems at the root of these developments appear to be social and economic in origin as opposed to academic (Davis and Borders-Patterson, 1971).

Special program students have similar problems. Charles Gordon, in a follow-up of a UB graduating class, found that the participants encountered these problems: (a) labeling or stigmatization, (b) unrealistic scheduling of classes, (c) inability to communicate with professors and students, and (d) a distracting involvement of militant movements on campus (Gordon, 1969).

Chapter 4

What Has Been The Impact of Upward Bound, Talent Search, And Similar Programs on their Target Populations?

I. INTRODUCTION AND GENERAL COMMENTS

The burgeoning of federal activity centered in the "Trio Programs"—Educational Talent Search (ETS), Upward Bound (UB), and Special Services (SS)--has hardly been accompanied by a coordinated or complimenting series of evaluation studies. Funds have not been provided in the basic grants for evaluation; the projects apparently have been staffed with developmental specialists, with few committed professionals who are of the interests and background that would permit carefully designed examination of impact. Also, as Etzioni (1971) has pointed out:

> In reviewing the findings of about 150 different studies of various systems of compensatory education, I have concluded that evaluating the effects and benefits of this approach is an extremely difficult undertaking. No piece of evidence with which I am familiar supports the notion that, by putting disadvantaged students through a few courses, seminars, weekend workshops, or summer sessions, one can remedy the effects of four hundred years of discrimination or of the four or five years that separate disadvantaged students from their academically prepared classmates. One does find in the literature that cases of three students here and eight students there who have benefitted from such programs; however, the main conclusion from the same body of literature points to the need for reaching the disadvantaged student as early in his academic career as possible (p. 115).

All too often program evaluations have been limited to "in-house" efforts. The paucity of comprehensive longitudinal studies of special program participants was pointed out by Kendrick and Thomas (1970). No study reviewed in this literature search has, for instance, tracked a senior

class of special program students for four years after high school graduation. Cumulative college GPA and retention can only be projected. Consequently there is no empirical evidence on the long range educational achievement of these students. There have been two obvious explanations for the absence of longitudinal research. First, until now the programs, most of which were initiated in the mid-1960's, were too recent to have generated many college graduates. However, since UB and ETS began in 1965, there are now five UB and ETS classes which graduated from high school at least four years ago. It is unfortunate that there exists no accurate record of the proportion of students from each class who graduated from college. A second explanation for the absence of longitudinal research is prohibitive cost. However, the long range impact of special programs on the educational achievement of participating students is the most critical measure of their success. If programs could keep up-to-date records on former students, then the expense of tracking them down later would be reduced.

II. TALENT SEARCH AND SIMILAR PROGRAMS: EVALUATION RESEARCH

Educational Talent Search, which utilizes an information dissemination and counseling approach has not, to date, been evaluated. Similarly, only three research studies of similar programs were uncovered in this literature search. One possible reason for this may be the difficulty of tracing students served, given that their contact with the program is shorter, less intensive, and more infrequent than in a program using the UB model. Three articles on similar programs, however, were located.

Wilkerson, in an evaluation of the College Assistance Program, interviewed program counselors, students, and high school personnel who participated in the program between 1964 and 1966. In this program special counselors confer with high school counselors, distribute literature on college opportunities, and make high school assembly presentations on higher educational opportunities. Wilkerson found that (a) students perceived that counselor visits had a positive effect on their educational development, (b) high school guidance counselors felt aided in their attempts to counsel disadvantaged students, and (c) participating colleges modified their recruitment, financial

aid, and admissions policies as a result of the program (Wilkerson, 1967). A study conducted by Alexakos, of a high school guidance laboratory program, produced similar positive results. He reported that program participants performed better in college than a matched group who did not participate (Alexakos, 1967).

One of the earliest attempts to develop the talent of disadvantaged junior high and senior high school students was the Demonstration Guidance Project in New York City conducted from 1958-62. The objective of this effort was to improve the guidance and instructional services available to the disadvantaged urban population. In an assessment of the program's success, the program proved to substantially increase the college matriculation rate of the target population (Wrightstone, et al., 1963).

The ETS concept, however, has recently come under attack for several reasons. Initially, it is necessary to question whether there exists now significant numbers of talented students in disadvantaged populations who do not have access to higher education. Unfortunately there is little evidence on what happens to minority youth who score high on tests and perform well in high school (Kendrick and Thomas, 1970).

Secondly, if the definition of the target population of talented students is expanded to those whose talent is potential and not manifest through traditional measures, then the needs of the program participants will expand accordingly; a student will require more than simple information and a push in the right direction, he or she will require some sort of academic assistance or compensatory effort.

Finally, one author, in an article entitled "The Black Agenda for Higher Education," has suggested that the idea of the "talent search" as a method of singling out a few gifted minority students is no longer acceptable in the Black community (Lane, 1969). Certainly a national educational strategy should not be limited to searching for talent in minority communities only (Kendrick and Thomas, 1970), and this is not the case for ETS. However, if the majority of ETS program participants are individuals whose potential talent requires some additional assistance, then the process of facilitating their access to institutions where they will be relegated to general college curricula may be futile.

III. EVALUATIONS OF UPWARD BOUND AND SIMILAR PROGRAMS

Upward Bound, unlike ETS, has been evaluated numerous times. Its design and content seem to be typical of precollege programs for the disadvantaged at least from the standpoint of programs described and evaluated in the literature. A residential compensatory session in the summer preceding college entrance appears to be a common approach to meeting the needs of disadvantaged students. Among the more well known programs are A Better Chance (ABC), College Readiness, and College Bound. These programs and several others will be discussed prior to summarizing status of research on UB.

A. Similar Programs

The ABC program is a summer transitional program, almost identical to Upward Bound, conducted at a number of secondary schools and colleges. Wessman, in a two-year follow-up of a program class, found that only 30 percent of the participating students fit the ideal model of the motivated, although disadvantaged, student, while 24 percent were already good students before they entered ABC and 46 percent did mediocre to poor work at entrance and continued to do so. Thus a majority of the participants either did not need the program or could not benefit from it. Wessman also found no change in IQ and English achievement tests as a result of the program. The only significant changes occurred in attitudes and personality, i.e., increased self-confidence, increase social ease and awareness, higher goals, higher tolerance and flexibility, and increased anxiety and drive. Wessman concludes that the unimpressive results of this program warrant a reevaluation of compensatory efforts (Wessman, 1972).

An evaluation of the College Readiness program, another summer transitional program, at San Marcos College produced rather dismal results. Students, once in college, were found to have generally poor grade point averages. Forty percent were on academic probation (Pearce, 1968). Another program, designed to identify disadvantaged ninth graders and to increase their motivation, achievement and educational chances, was studied by Tanner and Genare in 1965. The program included both a summer and an academic year component,

however, the participating group was divided such that part received academic year assistance only and part participated in both the summer and academic year sessions. The authors found that the summer group showed only a slight advantage over the other group in grades, attendance, and attrition (Tanner and Genare, 1967).

Two other programs--College Bound and a summer study skills program--showed more encouraging results. College Bound, a summer residential program in English, math, and counseling for ninth and tenth graders, was evaluated using pre- and post-standardized tests. Test results showed four months reading and two years math gain for program participants (Hillston, 1967). Similarly an evaluation of a summer study skills program between 1964 and 1966, reported test score gains. One hundred fifty nine students aged 14 to 16 attended a structured program of remedial work. They were tested before and after the summer session and the test results showed highly significant gains in math, English, and vocabulary. Eighty-four percent of program participants enrolled in college. In addition to empirically testable academic benefits, the students perceived a beneficial influence of the program. They reported better planning and organization of their work and better study habits (Comer, Harrow, and Johnson, 1969).

In summary, the evidence on the effectiveness of summer compensatory programs similar to UB appears contradictory. Two of the programs reviewed reported poor student performance in college. Another two reported test score gains in such subjects as reading, math, English, and vocabulary. Three studies reported positive effects on student attitudes and/or motivation.

B. Upward Bound

The U.S. Office of Education has sponsored numerous national level evaluations of UB. In addition, individual projects have been evaluated privately. National studies have been conducted by Greenleigh Associates, the American College Testing Program, Applied Data Research, Cyborn Education, Inc., Educational Associates, Inc., Syracuse Youth Development Center, the Resource Management Corporation, and the Primary Prevention Research and Development Center. A summary of the major findings of these studies will be presented under two headings: (1) impact of program on students and (2) impact of program on institutions and communities.

1. Impact of Programs on Students

The impact of UB on students should be assessed from five perspectives: (a) immediate impact of program on student ability, attitudes, motivation, high school attrition, and high school performance, (b) impact of program on postsecondary enrollment rates, (c) impact of program on college performance, (d) impact of program on college retention, and (3) impact on ultimate career attainment and SES status. The extent of data available on each of these areas will be discussed below.

Upward Bound does not appear to increase academic ability as measured by standardized test scores. A study of the 1970 bridge class of Applied Data Research found that PSAT scores of UB students do not increase as a result of the program (Applied Data Research, 1970). Neither does UB have an impact on high school grade point averages of program participants. Studies by both Greenleigh Associates and by Hunt and Hardt demonstrate that high school GPA's of UB students, as compared with those of a matched control group, do not change significantly as a result of the UB process (Greenleigh Associates, 1970; Hunt and Hardt, 1968). UB does however appear to influence college aspirations. Although 80 percent of the UB participants were enrolled in a college preparatory program before they entered UB, 9 to 12 percent of those who were in other high school programs changed to academic programs after enrolling in UB (Greenleigh, 1970). In addition UB seems to have had an impact on high school attrition rates. While only 7 percent of UB students drop out of high school, 30 percent of other low income students drop out (Greenleigh, 1970). This could, of course, represent selection rather than impact factors.

In the realm of attitudes and personality, the impact of UB is less clear. Paschal and Williams reported no significant changes in student's self-concept as a learner or in attitudes and point out that six weeks is too short a time period to expect significant changes. He noted that to maximize its impact UB should recruit students from earlier grades (Paschal and Williams, 1970). Hunt and Hardt, however, found a positive effect of bridge summer participation on seven measures

of student attitudes and motivation. These were: (a) motivation for college, (b) possibility of college graduation, (c) self-evaluation of intelligence, (c) interpersonal flexibility, (d) self-esteem, (e) internal control, and (f) future orientation. Of these (a), (c), and (e) continued to increase throughout the academic year (Hunt and Hardt, 1969). However, in a 1968 evaluation of the University of Maryland UB program, and using matched controls, Herson found no significant change in achievement-related values. Only one significant change in UB students' attitudes was cited, which was an increase in the experimental's willingness to meet academic requirements in order to obtain a good job (Herson, 1968).

Upward Bound does appear to substantially increase the chances for college enrollment of disadvantaged students. While it seems reasonable to estimate that less than half of all disadvantaged high school students enter college, several studies demonstrate that the college enrollment rate of UB students is much higher. Gardenshire found that approximately 80 percent of the 1965 and 1966 UB graduating classes entered college (Gardenshire, 1968). Hunt and Hardt reported that 75 to 80 percent of the 1967 UB classes were admitted to some type of postsecondary institution, and that 90 percent of these students went to a college rather than another type of postsecondary school (Hunt and Hardt, 1968). Thus on the average, about two-thirds of Upward Bound students enter college, as compared with less than half of all low income or ethnic group students and approximately two-thirds of those seniors whose families are in the top income quarters.

Reports on the scholastic achievement of UB students in college are curiously absent from the major national studies of UB. The only discussion of college GPA's of UB classes which was uncovered in this search was found in a progress report of the Hawaii UB project. The college grade point averages of their classes of 1967, 1968, and 1969, each averaged below 2.0 (Hawaii Progress Report, 1970). While this is not a particularly encouraging finding, it cannot, of course, be taken to represent national averages for UB students. The absence of college grade point information from the two most significant studies of UB--

the Greenleigh report and the Hunt and Hardt study--constitutes a significant and critical gap in the present state of knowledge about the success of Upward Bound.

College persistence of UB students is another key area where the major studies fall short. The lack of information stems from the nonexistence of a longitudinal study to track former UB students through four years after they leave the program. While retention rates are a major subject of discussion in most UB evaluation studies, no study has tracked a class through more than six semesters. Thus ultimate graduation rates are only estimated and not empirically demonstrated. Gardenshire followed the UB bridge class of 1965 and found 77 percent still enrolled in college three years later. He also tracked the class of 1966 through June 1968 and found 82 percent still enrolled (Gardenshire, 1968). Mertens in the 1970 UB College Retention Survey, reported a 71 percent retention rate for UB students in college during the period from fall 1966 to fall 1969. However, this figure of 71 percent represents the combined retention of freshmen, sophomores, and juniors, thus obscuring the long range retention rate of those who entered in fall of 1966 (Mertens, 1970).

The projected UB college retention rate made by Greenleigh Associates was 50 percent, the same, they believe, as the national average (Greenleigh, 1970). This estimate, however, cannot be taken as conclusive. Since there are now five classes of UB students who graduated from high school more than four years ago, it is necessary to follow up their progress in order to validate Greenleigh's estimate.

Since no comprehensive follow-up of early UB classes has been conducted, it is impossible to assess the impact of UB on the economic and occupational status of these students. If the ultimate objective of ETS and UB is to equalize economic opportunity for the disadvantaged, then the most critical measure of their success should be the eventual economic and occupational attainment of those students who participated. However, our knowledge about this aspect of program impact is limited to project estimates of the potential increase in occupational and economic attainment.

In summary, the state of our knowledge about the impact of Upward Bound on participating students is limited and somewhat contradictory. The following list summarizes the data covered by type of impact.

a) Immediate Impact: High school GPA's and standardized test scores do not increase, while the evidence is somewhat contradictory, UB does appear to have a positive influence on attitudes, motivation, and personality. UB also reduces high school attrition rates for participants and causes some students to change high school degree programs.

b) College Enrollment: UB does substantially increase the college entrance rates of disadvantaged students. Approximately two-thirds of UB participants attend college as compared with less than half of all disadvantaged students.

c) Scholastic Achievement in College: There is no conclusive national level evidence on this area.

d) College Persistence: While Greenleigh estimates a graduation rate of 50 percent, there is no conclusive evidence beyond relatively high persistence through five to six semesters of college.

e) Economic and Occupational Attainment: No data exists on this topic.

2. Impact of UB on Educational Institutions

Two further goals of UB and ETS have been to open up colleges and universities to disadvantaged students with potential for college and to make high schools more responsive to the needs of this type of student. Thus the success of UB and ETS is also measurable in terms of what impact it can have, in the long run, toward increasing educational and economic opportunities for all disadvantaged students. Through a "ripple effect," UB and ETS can affect changes in those institutions which traditionally deal with and influence disadvantaged students. This area has been touched upon in several major UB studies and articles.

Both Greenleigh Associates and Levitan reported little or no observable impact of Upward Bound on secondary schools (Greenleigh, 1970; Levitan, 1969). Greenleigh attributed this negligible impact to:

a) Inability of UB personnel to communicate the program's goals and practices effectively.

b) Traditional perceptions of educators who are suspicious of policies and practices of UB.

c) The small numbers of UB students coming from each high school.

Greenleigh did, however, cite some evidence of Upward Bound's impact of higher educational institutions. Interviews with college personnel revealed this impact in the form of modified admissions practices, special programs for disadvantaged students, and additional special courses. In addition he noted some negative effects in the social sphere, primarily friction and perceived hostility between UB students and other college students. However, Greenleigh notes that these attitudes are slowly disappearing (Greenleigh, 1970).

Saunders and James, in their study of financial aid, also discussed the institutional impact of UB on financial aid practices. In interviews with administration personnel they found that UB students were receiving preferential treatment in financial aid offices (Saunders and James, 1968). The authors recommended a comprehensive financial aid program for UB students.

IV. COLLEGE LEVEL PROGRAMS FOR THE DISADVANTAGED

While programs at the college level are not an area of concern in this design study, a brief review of types of programs and their success rates can provide insight into the continuing needs of disadvantaged students once in college. Most such programs provide remedial work, tutoring, and counseling. Examples of the more well known of such programs include College Discovery, SEEK, and CEAP. These and others will be discussed below.

College Discovery provides counseling, tutoring, and remedial work for disadvantaged students in community colleges. Kweller, in a discussion of this program, reported that course schedule and load was a critical variable in student success. Given the right balance of credit and remedial courses, disadvantaged students performed almost as well as regular students. In addition they ended up completing almost as many course credits as other special students who attempted to carry a full course load. The graduation rate of these students was 40 percent, with half of those graduating going on to complete their degree at a four-year college or university. Kweller sums up his report by recommending the skillful use of supportive services and wise counseling to increase retention rates (Kweller, 1971).

SEEK provides the same services as College Discovery. A recent study of student attitudes toward this program provides some interesting insights into the developing needs of disadvantaged students as they progress through college. While their general satisfaction with the program remained throughout, their initial identification with and dependence on the program diminished over time. The authors noted a switch in student preference for program components. Initially freshmen were more concerned with counseling and later with tutoring and remedial work. Evidently the initial social adjustments of the freshman year were facilitated by group counseling sessions, but later they were resented as a reminder of their disadvantaged status. Once social adjustments were made, students' concern over course work increased and accordingly their appreciation of tutoring rose (Backner and Beckenstein, 1970).

In an article, entitled "Counseling Black Students in Special Programs," Hattenschwiller stresses the need for effective counseling, especially in the first year. He notes that Black students often lack "anticipatory socialization" in that they have not internalized the role of college student. Thus the counselor's role is to equalize resources, help the disadvantaged student negotiate the system, and to lay out the rules of the game (e.g., institutional rules and bureaucratic demands). A study by Hattenschwiller, conducted in 1969, showed that, controlling for ability, students with preentrance home visits by a counselor demonstrated significantly higher academic performance than students whose counseling experience began after college entrance (Hattenschwiller, 1971).

The relevance, to UB and ETS policy, of these findings and others like them lies in the need to ensure adequate support services for placed students. A strong freshman year follow-up and a liaison with college personnel may be necessary to provide for the continuing needs of these students. Unfortunately, junior colleges and community colleges, which enroll large proportions of disadvantaged students, have been found to be deficient in this area. A national survey of junior colleges reported that only 20 percent designed special curricula for disadvantaged students (Roueche, 1968). Berg and Axtell found that 53.4 percent of junior colleges attempt to meet the needs of the disadvantaged with their regular instructional program (Berg and Axtell, 1968). Edmund Gordon, in an essay on compensatory education for the disadvantaged, contrasted the imaginative and valid curricular innovations used in precollege programs with the dreary pattern of college remediation (Gordon, 1966).

A follow-up of UB graduates from the Wayne State program was conducted by Charles Gordon. This program has a strong in-college component which is directed toward modifying the student's fear of failure. He notes the presence of such problems as unrealistic scheduling, indefinite financial assistance, militancy, labeling, inability of students to communicate, and problems in long range planning. The Wayne State program attempts to help students establish priorities. Their follow-up component involves: (a) establishing a campus contact for each student, (b) providing continuous compensatory support, (c) keeping parents informed, (d) maintaining acquaintance with college personnel, and (e) advising on class scheduling (Gordon, 1969). He concludes that it is unrealistic to expect that an UB or ETS student will not continue to need supportive services when he enters college.

A major attempt to evaluate the impact of Special Services and similar programs for disadvantaged students (Davis, Burkheimer, and Borders-Patterson, 1975) produced, as perhaps its major empirical finding, evidence as to the saliency of several intervening variables that make evaluation of impact difficult. First, with regard to achievement and satisfaction criteria, there are strong ethnic group interaction effects, with race appearing to explain a larger portion of variance than poverty/nonpoverty status.

Second, academic progress, and a host of satisfaction or aspirational variables, seem to be more a function of the particular college and campus context than of student input or support program characteristics per se. Considering the impact of support programs on students across ethnic groups and across institutions yields a diffuse and uncertain picture. However, when these difficulties are attacked by appropriate adjustments for institutional and ethnic group influences, some value of programmatic intervention strategies at the postsecondary level is suggested, demonstrating among the disadvantaged students greater academic progress and higher indices of satisfaction and aspirations for those participating than for nonparticipants.)

This finding (of the race interaction and institution interaction) could, of course, explain readily the contradictory results of other single programs or single institution studies. Ability levels of students and institutional attrition rates among higher education institutions, have been frequently documented as varying sharply from one college to another. Given the possibility of similar variation in institutional climate, and the absence of studies that might reveal elements (e.g., "critical mass" of students in a distinguishable minority; faculty attitudes; and curricular practices) that are crucial in providing the disadvantaged student true membership in the prevailing college culture, an adequate evaluation must take into account intra-group and intra-institutional differences.

Also, to echo a need reflected throughout this brief review: it would seem necessary to employ a longitudinal study to determine if disadvantaged students involved in current precollege or college special support programs do indeed persevere and perform satisfactorily in college over time. Most studies of disadvantaged students in college (with the notable exception of the Greenleigh study) deal, of necessity, with those who remain in college long enough to obtain a grade; those students who may quickly fade from records must be identified.

In sum: there is an abundance of rhetoric, a paucity of empirical data with conflicting results, and little agreement except that the problem of equal access and equal opportunity for the disadvantaged once in higher education is not a simple proposition of infusion of money or one or another catch-up activity. There appear to be real differences that are a function

of personal and institutional variables not specifically studied. These variables, at most, may outweigh special programmatic variables; at least, it would seem they need to be considered in tailoring special intervention efforts.

Chapter 5

Cost Benefit Analyses

I. GENERAL

Cost benefit and cost effectiveness analyses are simply popular terms for an economic analysis of any program or action. These analyses can be part of a larger decisionmaking strategy, such as systems analysis or program budgeting, or they may be performed within their own narrower framework. In either case, these are quantitative analyses whose intent is to provide a criterion or standard for decisionmaking in order to rationally and optimally allocate a given set of scarce resources among competing ends.

In several studies reviewed during this design effort, the terms cost benefit (benefit cost) and cost effectiveness appear to be used interchangeably. However, some writers make a distinction: cost benefit analyses treat monetary indices of program performance while cost effectiveness analyses are more general and may have either monetary or nonmonetary indices of performance. With respect to the design of the UB/ETS evaluation, we will use the term cost benefit analysis to refer to an analysis of increases in incomes resulting from additional educational experiences; cost effectiveness analyses refer to the relationships between program costs and measures of program effectiveness such as high school graduation rates and postsecondary enrollment and retention rates.

In order to assist in the development of any subsequent benefit analyses using the data obtained in this study, a brief review of existing literature of cost benefit analyses of educational and training was conducted. This review was organized around the following topics: methodological issues, existing studies of educational programs for the disadvantaged, treatment of principal issues for UB/ETS cost benefit analysis, and limitations of existing studies with respect to the requirements for UB/ETS cost benefit analysis.

II. METHODOLOGICAL ISSUES

Prest and Turvey (1965) in their survey of cost benefit analysis, outline the general principles of cost benefit analysis:

a) Which costs and which benefits should be included?

b) How are they to be valued?

c) At what interest rate are they to be discounted?

d) What are the relevant constraints?

Each of these principles is discussed in detail and applications of cost benefit analysis to particular types of projects, including education, are presented.

Several surveys of the methodological issues of cost benefit analysis as applied to analyzing education and training investments are available. These include Warmbrod's (1968) and Stromsdorfer's (1972) surveys of studies of vocational and technical education, Hardin's (1969) review of occupational training programs and Nay, et al's. (1973) and Goldstein's (1972) reviews.

In reviewing the application of cost benefit analysis to manpower programs, both Hardin (1969) and Cain and Hollister (1969) indicate that these measures may be developed from at least three different viewpoints--society as a whole, the individual trainee, and the government as an organization. However, they point out the difficulties of measuring costs and benefits from the government's viewpoint and argue against this application of benefit cost analysis. Stromsdorfer (1969, p. 157) agrees, stating that if a program pays off from a social point of view, tax rates can be appropriately adjusted to make it pay off for any given governmental unit.

Davie (1967, pp. 310-311) lists the benefits and costs to both society and the individual from participating in education and in general and vocational education in particular. The principal elements to be noted for the UB/ETS evaluation design are that social benefits are measured primarily in terms of additional earnings gross of taxes while the individual's benefits are measured primarily in terms of increased earnings after taxes, and that costs to society are measured net of transfer payments. Further illustrations of differences in measures of costs and benefits from society's and the individual program participants' viewpoint are provided by Nay et al. (1973).

In order to use the results of cost benefit analysis in program decisionmaking, an investment criterion must be specified. Stromsdorfer et al. (1971) list six such criteria: benefit and cost differentials, payback period, net expected present value, cost benefit ratio, expected annual net benefit, and expected internal rate of return.

There has been considerable confusion in the literature and practice of cost benefit analysis over what constitutes the "correct" investment criterion. Most of this is related to confusion between specification of quantity to be maximized (the maximand) as distinct from the criterion to achieve the goal of the maximand. Since cost benefit analysis is an economic efficiency concept, the correct maximand is the net present value of benefits. Depending on the nature of the constraints present in the analysis, any of the last four criteria listed above may achieve this maximand, with neither of the criteria theoretically correct for all investment situations. For most educational investments, since there is capital rationing or a budget constraint in the sense that an individual may not be able to participate in a wide range of alternatives, Stromsdorfer et al. (1971) recommend that the benefit cost ratio be used as the proper investment criterion.

A considerable amount of controversy exists over the use of cost benefit analysis for interprogram comparisons. For example, in comparing manpower programs, it has been stated that cost benefit analyses are inappropriate since the programs serve a different clientele, program goals differ and services provided differ in length of time and in kind.

However, Barth (1972, p. 6) argues to the contrary. He states that manpower program goals do not really differ, even if they did, through cost benefit analysis one can determine how efficient various programs are in achieving separate purposes. Furthermore, he points out that, since an appropriately designed cost benefit analysis measures changes in outcomes (compared to some "control" group) and not outcome, it is appropriate to use the results of interprogram comparisons.

Because of the effects of discounting over long time periods, problems will exist in using cost benefit studies in comparing programs serving persons of different ages. Since this situation does not apply to UB or ETS programs, it seems appropriate to use the results of the cost benefit analysis as one measure of interprogram comparison.

Finally, Nay et al. (1973) point out that extensive variations of benefits and costs occur within federal manpower training programs. A range of 1.8 to 2.3 for cost benefit rates for MDTA institutional training projects has been reported. Much of this information is lost by working with gross averages. In order to provide an appropriate basis for program improvement, data on this interprogram variation must be available. Only through this procedure can the reasons for success of certain projects be determined and this knowledge transferred to other projects within the program.

III. TYPICAL STUDIES

There have been four previous cost benefit studies of the UB program; similar studies for ETS were not uncovered during this literature review.

The first, preliminary analysis of UB was performed by Segal (1967). Because only early data were available on the actual success of the program at the time this analysis was undertaken, Segal's results should be interpreted as only tentative. Based on various broad, general assumptions her results indicated benefit cost ratios to society ranging from 1.65 to 2.77 using a 3 percent discount rate and from 0.95 to 1.74 when discounted at 5 percent.

Freeman and Bailey (1968) restricted their cost data to the Upward Bound program at Bowdoin College. They concluded that the UB program (at least in its sex-race composition at that time) was not feasible on strict economic efficiency grounds if the appropriate interest rate is deemed to be 8 percent or greater. Since at the time of their study a large number of UB students were still enrolled in high school, they concluded that the program might be feasible at a 5 percent or lower discount rate if a sufficiently large percent of participants enrolled in and completed their college education.

The Resource Management Corporation Study (1969) indicated considerably higher benefit cost ratios than either of the previous studies: 4.8 at a 5 percent discount ratio, 3.4 at 8 percent and 2.6 at 10 percent. Unfortunately, the report of the benefit cost analysis was so brief that it is difficult to completely understand the procedures used to question some of the implied assumptions.

The most comprehensive cost benefit analysis of the Upward Bound program has been reported by Garms (1969, 1971). Using older siblings of the same sex as a control group, Garms analyzed private, social, and government benefits and costs of the Upward Bound program for the four White-non-White male-female race-sex combinations. Private net benefits were shown to be positive for all four race-sex combinations at discount rates of 5 and 10 percent. Social net benefits were positive at the 5 percent discount rate, but negative at the 10 percent rate. Therefore, Garms concluded that from an economic viewpoint, Upward Bound was at best a marginal program, and that justification for its continued existence must be sought in presumed benefits not accounted for in his study.

Evidence of the continuing debate over the appropriate rate to discount social benefits appears in the exchange between Christoffel and Celio (1973) and Garms (1973) concerning the use of a 10 percent rate. Christoffel and Celio contend that the 10 percent rate is too high in that it includes an unreasonable increment for risk; Garms contents that a 10 percent rate is not unreasonably high. From a review of cost benefit analyses of other educational and training programs and from the fact that the U.S. Office of Management and Budget in Circular A-94, recommends a 10 percent rate for discounting the benefits of social programs, it appears that Garm's choice of 5 and 10 percent rates was appropriate.

Turning to cost benefit analyses of programs similar to UB/ETS, an evaluation of the Neighborhood Youth Corps (NYC) was reviewed. The objective of the in-school and summer NYC programs is to further the educational attainment and improve the performance of new entrants into the labor force. Although the program does not focus on improving college enrollment and retention rates of its participants, to the extent that NYC increases high school graduation rates, opportunities for postsecondary educational experiences may be improved. Stromsdorfer (In Somers, et al., 1969) estimated the following measures of education benefits for NYC participants: probability of high school graduation, years of high school completed, probability of attending college, and probability of attending any postsecondary institution.

He found that the NYC program had a positive and relatively large effect on the probability of college attendance or other postsecondary

education for those NYC participants who graduate from high school. The evidence suggested that the higher earnings due to NYC participation may have been partly responsible for enrollment in further education. When the sample of participants was classified into various race-sex groups, the program's effects on attendance in college or other postsecondary educational institutions appeared to be strongest for Whites, Mexican Americans, and for males of all races.

Although a benefit cost analysis of the effects of this additional education was not undertaken, average costs of NYC program participation were reported. These were reported for combined in-school and summer enrollment as follows: social costs-$402; Federal government costs--$313; and private costs--$834. In order to place these results into appropriate perspective, more thorough comparison of the costs and educational benefits of the UB/ETS and NYC programs should be conducted during the UB/ETS evaluation study.

IV. TREATMENT OF PRINCIPAL ISSUES IN UPWARD BOUND/ EDUCATIONAL TALENT SEARCH COST BENEFIT ANALYSIS

Several studies in the literature have reported methodologically appropriate cost benefit analyses of educational programs with certain factors common to the UB/ETS evaluation. Becker (1964) and Hines, et al. (1970) have all reported social and private rates of return to various levels of schooling.

Each of these authors developed age-earnings profiles for various age-sex-educational attainment groups from data collected during the Census of Population. Miller (1966) has developed estimates of lifetime earnings by years of school, race, occupation, and region of residence, a data source that might also prove useful for the UB/ETS cost benefit analyses.

Turning to the basic orientation underlying efforts to improve conditions to the disadvantaged during the first half of the 1960's, many policy-makers supported the contention that public education and, to a somewhat lesser extent, institutional training were probably the most effective instruments for combating poverty. However, more recent empirical research--much of it using microdata--strongly challenges the conventional wisdom

that links non-White poverty in particular to inadequate programs in education, health, and other forms of investment in human capital.

This recently available evidence suggests that programs that focus on the "supply" side of the labor market may be of only marginal efficiency. These data further indicate that, as a short-term antipoverty policy instrument, education without an availability of jobs that utilize and reward the capabilities of disadvantaged workers is unlikely to have much impact. In other words, a complete and effective set of antipoverty policy instruments should focus on both the demand and supply sides of the labor market.

Of particular note with respect to issues raised in the design of an evaluation of Upward Bound and Educational Talent Search is a recent study by Harrison (1972) that focuses on the relationships between education, employment, and income for ghetto areas of 10 cities. Harrison found that education may help both Whites and non-Whites to move into what are nationally considered to be more prestigious positions. But, once there, the non-Whites find themselves underemployed again, receiving earnings hardly above the levels enjoyed in the previous position, and facing the same expectations of unemployment as before. For ghetto Whites, on the other hand, the occupational mobility facilitated by education is translated into substantially higher earnings and significantly lower risks of joblessness.

The policy implications of this and other similar studies are relatively clear. Although educational programs for the disadvantaged such as UB and ETS may provide increased educational opportunity for participants, subsequent improvements in employment and earnings are not necessarily equal for participants of various ethnic groups. Additional policies focusing more on the demand for labor for UB and ETS participants, may be necessary to improve their economic condition and thus break the cycle of poverty.

Finally, with respect to estimating a cost of UB and ETS programs with different emphases, a recent study of Hardin and Borus (1969) of costs of training programs in Michigan is of interest. Cost functions relating program instructional and administrative costs to length of course and total classroom hours were estimated by multiple linear regression procedures. Social and private cost benefit ratios were developed and presented for four categories of classroom hours per trainee under a variety

of assumptions concerning discount rates and time periods over which benefits were discounted.

V. LIMITATIONS OF EXISTING COST BENEFIT STUDIES

As indicated in the introduction to this section of the literature review the overall methodological approach of the cost benefit studies reviewed has been generally accepted and is considered to be appropriate. Certain problems continue, however, with measurements of costs and benefits, particularly when these are measured from the social viewpoint. All cost benefit analyses are incomplete in this respect to varying degrees and this factor should always be considered when using results of these studies in analyzing policy alternatives.

However, there are two specific limitations of a number of cost benefit analyses of educational programs, shortcomings that can be alleviated to varying degrees if appropriate data are available. These limitations are concerned with the omission or inadequate consideration of educational quality and student ability in estimating returns to education. Recent efforts have focused on adjusting estimates of educational returns for these factors, as indicated by the studies reviewed below.

Johnson and Stafford (1973) estimated social rates of return to both quantity and quality of schooling, with quality measured by annual per pupil costs of elementary and secondary education. The authors concluded that, although school quality influences earnings, the introduction of quality in a simple earnings model does not alter the effect of years of schooling in an important way. As a consequence, the authors conclude that previous studies that have estimated the return to years of schooling have probably not been subject to bias on this account.

However, the Johnson and Stafford study contains several, possibly serious, shortcomings. In addition to the fact that quality is imperfectly measured by expenditures, no estimates of differences in college quality are included in the model. Estimated earnings profiles for higher education levels are simple proportional upward shifts of the profiles for lower educational levels; the effects of student ability are also ignored.

Solmon (1973) and Wales (1973) have examined the relationships between earnings and college quality, using an approach and data sources that overcome the limitations of the Johnson and Stafford study. Solmon identified two distinct measures of college quality: peer group effects, measured by average SAT scores of entering freshmen, and faculty quality, measured by average faculty salary and a subjective measure of school quality termed the Gourman index.

Working with sample data from the upper half of the IQ distribution, Solmon concluded that college quality has increasing impacts on earnings over time, that is the income elasticity of quality is not statistically significant in the initial year of employment and is greater after 20 years than after 7 years. College quality appeared to have a greater impact on incomes for high ability students than for low ability students. When earnings functions were estimated for the sample divided into IQ quartiles, the coefficient on college quality rose steadily between the second lowest IQ quartiles and the highest quartile; however, the lowest quartile was affected by quality almost as much as the highest.

Working with the same sample data and using the Gourman index as a measure of college quality, Wales also found a significant relationship between earnings and quality of college attended. Earnings of individuals in the top fifth of the undergraduate school quality distribution and in the top two-fifths of the graduate distribution are significantly and substantially higher than earnings of others. However, the author points out that it is unclear to what extent the quality variable is reflecting educational quality as opposed to individual scholastic abilities, as measured in terms of selection to entrance to college.

Turning to problems of omitting a measure of ability in explaining earnings differentials, it is well known that if education and ability are positively associated, then a measure of the contribution of education to income (or earnings) that ignores the ability variable will be biased upward. A variety of studies that attempt to adjust for this bias have been published over the past 10 years, many of which are reviewed in Wolfle (forthcoming). Many of these studies suffer from one or more of these problems: poor measures of education and ability, inadequate sample size, improper statistical technique, or too specialized a sample from which to form generalizations.

However, several studies have recently appeared that are not subject to most of these criticisms, three of which are briefly reviewed below. At least part of each of these three studies uses a sample of World War II veterans and scores on the Armed Forces Qualifying Test are available for all members of the samples. Individuals in this sample have been resurveyed since their discharge from the Armed Forces in order to obtain follow-up data on their subsequent earnings and employment experience.

Griliches and Mason (1972) concluded that there appears to be support for the conclusion of strong economic and statistical significance of schooling on the explanation of observed differences in income. Their results indicated a relatively low independent contribution of measured ability. However, these results may be criticized on the grounds that the authors did not attempt to discern any interactions among the various determinants of income.

Hause (1970) attempted to overcome this shortcoming and sought interaction effects with the same body of data by running separate regressions within schooling levels and also be looking at cross-product terms for the pooled sample. Despite multicollinearity among the variables measuring the determinants of earnings, the coefficient on the interaction terms was positive and significant, which supported the hypothesis that measured ability and educational attainment are significantly complementary.

Critical of both Griliches and Mason's, and Hause's measures of ability, Taubman and Wales (1973) estimated earnings functions with a measure of mathematical ability rather than IQ. They concluded that mathematical ability, not IQ, is indeed as important as education in explaining the range of earnings. The bias when ability was omitted was approximately 30 percent to 35 percent at various educational levels for mathematical ability and only 9 percent for other types of mental ability.

From the evidence reviewed above, it is apparent that current interpretations of the relationships between earnings, ability, schooling, and various sociodemographic factors exhibit a wide range of variation. Since no follow-up data on earnings and other measures of postschooling employment experience will be available for the Upward Bound/Educational Talent Search evaluation, it will not be possible to employ the types of analysis techniques reviewed above to estimate returns to additional education for program participants. However, the results of these studies will be reviewed

in further detail in order to develop first-order adjustments to earnings differentials in order to reflect returns to additional education net of these intervening factors.

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